TITLE OF THE INVENTION

ELECTROLESS DEPOSITION OF DOPED NOBLE METALS AND NOBLE METAL ALLOYS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of application Serial No. 10/085,182, filed February 27, 2002, now Patent No. 6,693,366 ~~pending~~, which is a continuation of application Serial No. 09/652,208, filed August 31, 2000, now U.S. Patent 6,518,198, issued February 11, 2003.

BACKGROUND OF THE INVENTION

[0002] Field of the Invention: The present invention relates to semiconductor device structures including thin layers of conductive materials that are oxidation resistant and that act as oxidation barriers to protect underlying conductive or semiconductive structures. More specifically, the present invention relates to semiconductor device structures including thin layers with noble metals that have been doped to prevent the passage of oxidants therethrough, as well as to methods for forming such thin, doped noble metal layers. The invention also pertains to the use of electroless plating techniques to form oxidation barrier layers from noble metal alloys.

[0003] State of the Art: The thicknesses of conductive layers and conductive lines in conventional semiconductor devices may themselves prevent significant oxidation of these conductive layers and lines, as well as the passage of oxidants through these layers or lines. In the state of the art, however, the dimensions of features, including the thicknesses thereof, are ever-decreasing.

[0004] For example, in stacked capacitor structures, the thicknesses of the electrodes and capacitor dielectrics are continuously becoming smaller. As a result of the decrease in capacitor dielectric layer thicknesses, materials with higher dielectric constants, such as tantalum pentoxide (Ta_2O_5) and barium strontium titanate (BST or $BaSrTiO_3$), are being used with increased frequency.